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(56) Documents cited

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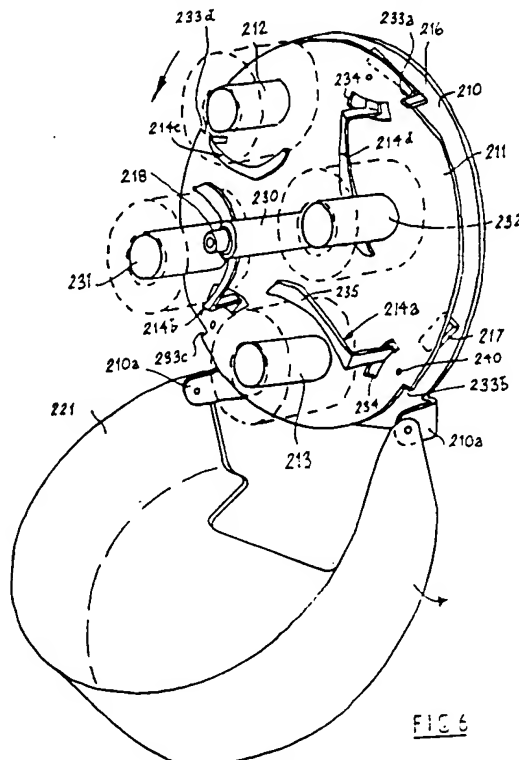
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## (54) Dispenser for disposable sheet supplied in roll form

(57) The dispenser, e.g. dispensing toilet paper, has rotatable support 211 carrying roll supports 211, 212, 231, 232, paper being dispensed from the roll on the lowest support. Each roll has a gravity-pivoted, residue-sensing lever 214 which rests on the roll and co-acts with adjustable stop 217 to hold support 211 still. When the dispensing roll reaches a minimum residue of paper, lever 214 is released from stop 217, and support 211 has a gravity-induced, anti-clockwise rotation until the next full roll is in the dispense position. Gravity-pivoted lever 216 co-acts with four ratchet teeth 233 to prevent clockwise rotation of support 211. Two other embodiments (Figs. 1 to 4) support two rolls, with similarly automatic roll advance.



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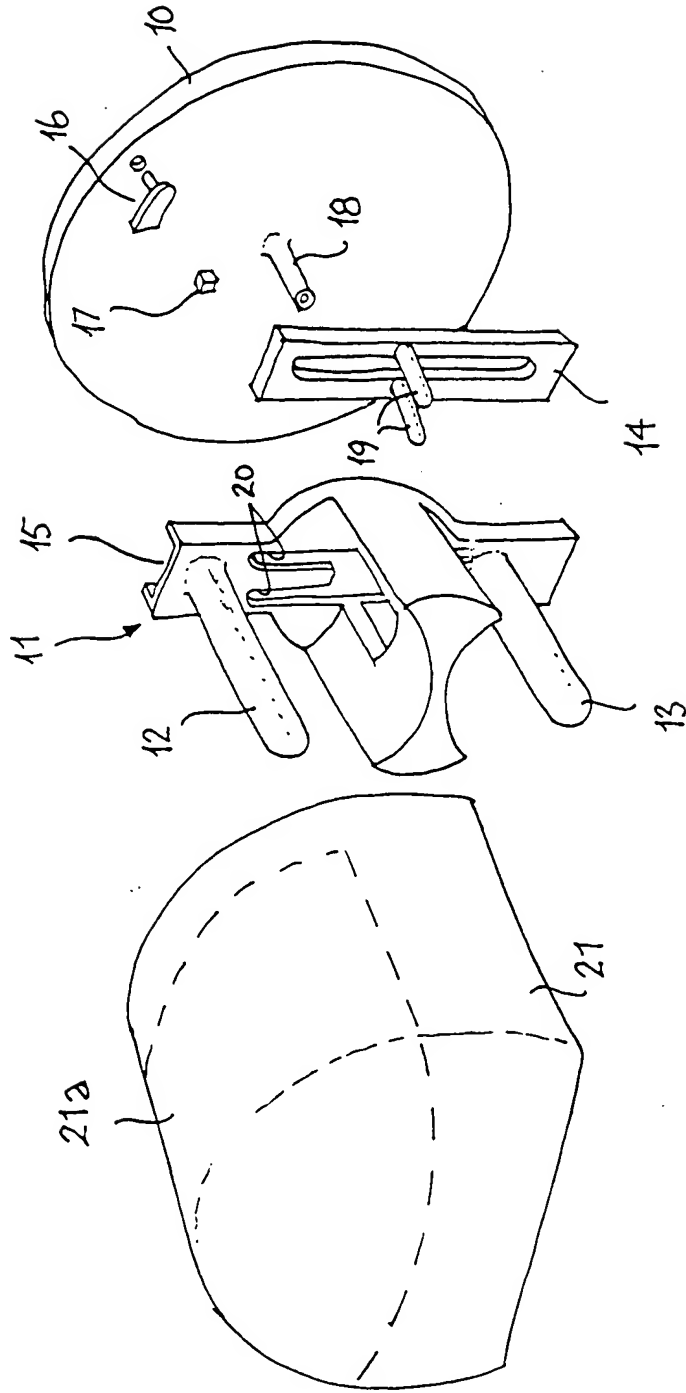


FIG. 1

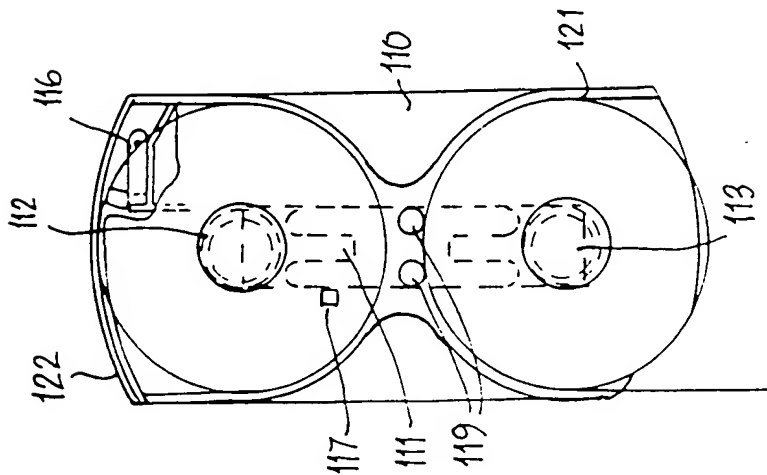


FIG. 2

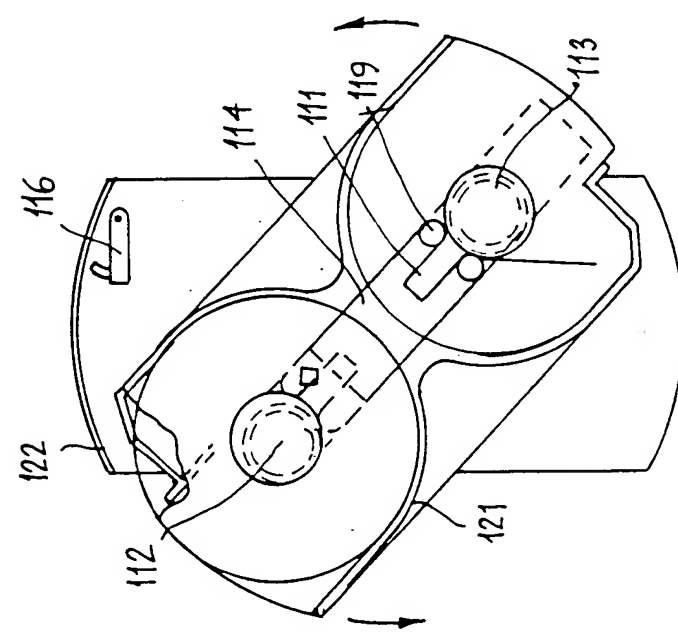


FIG. 3

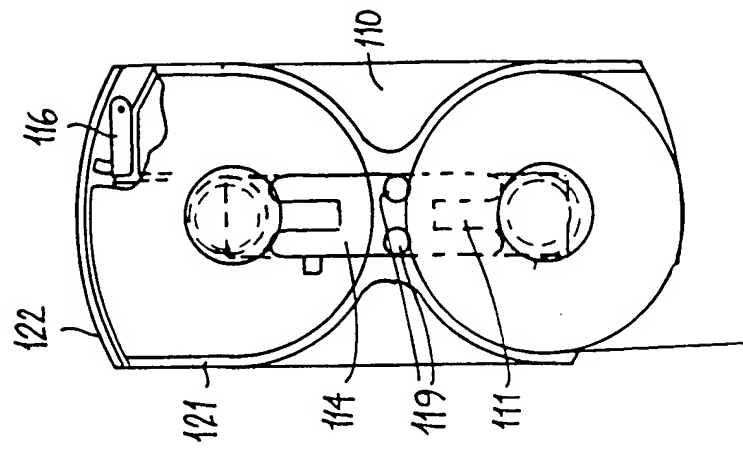


FIG. 4

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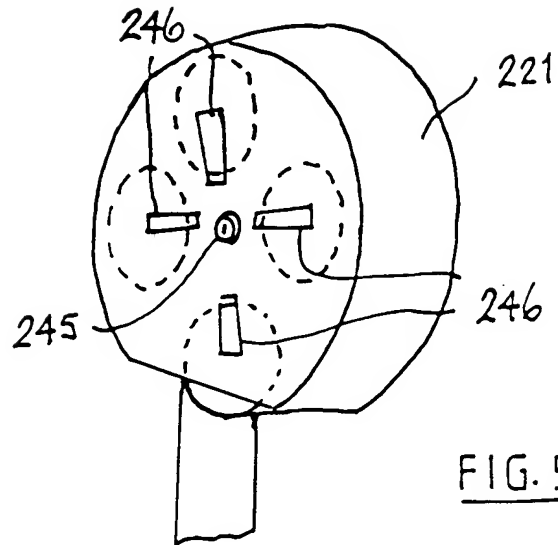


FIG. 5

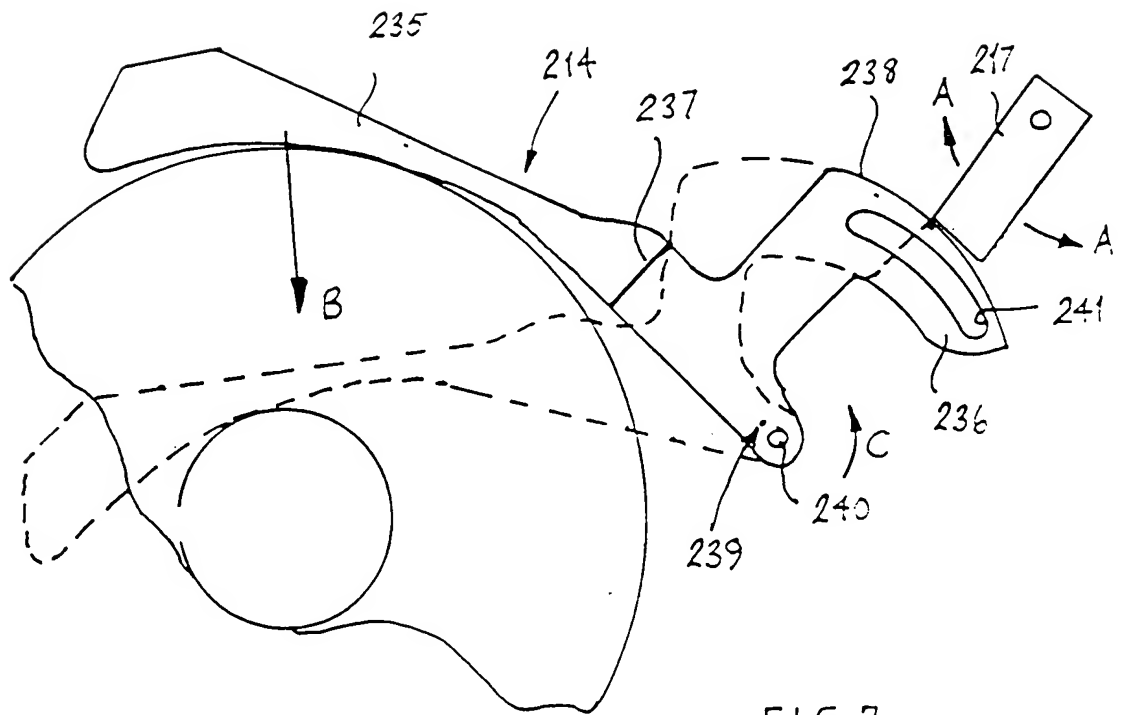
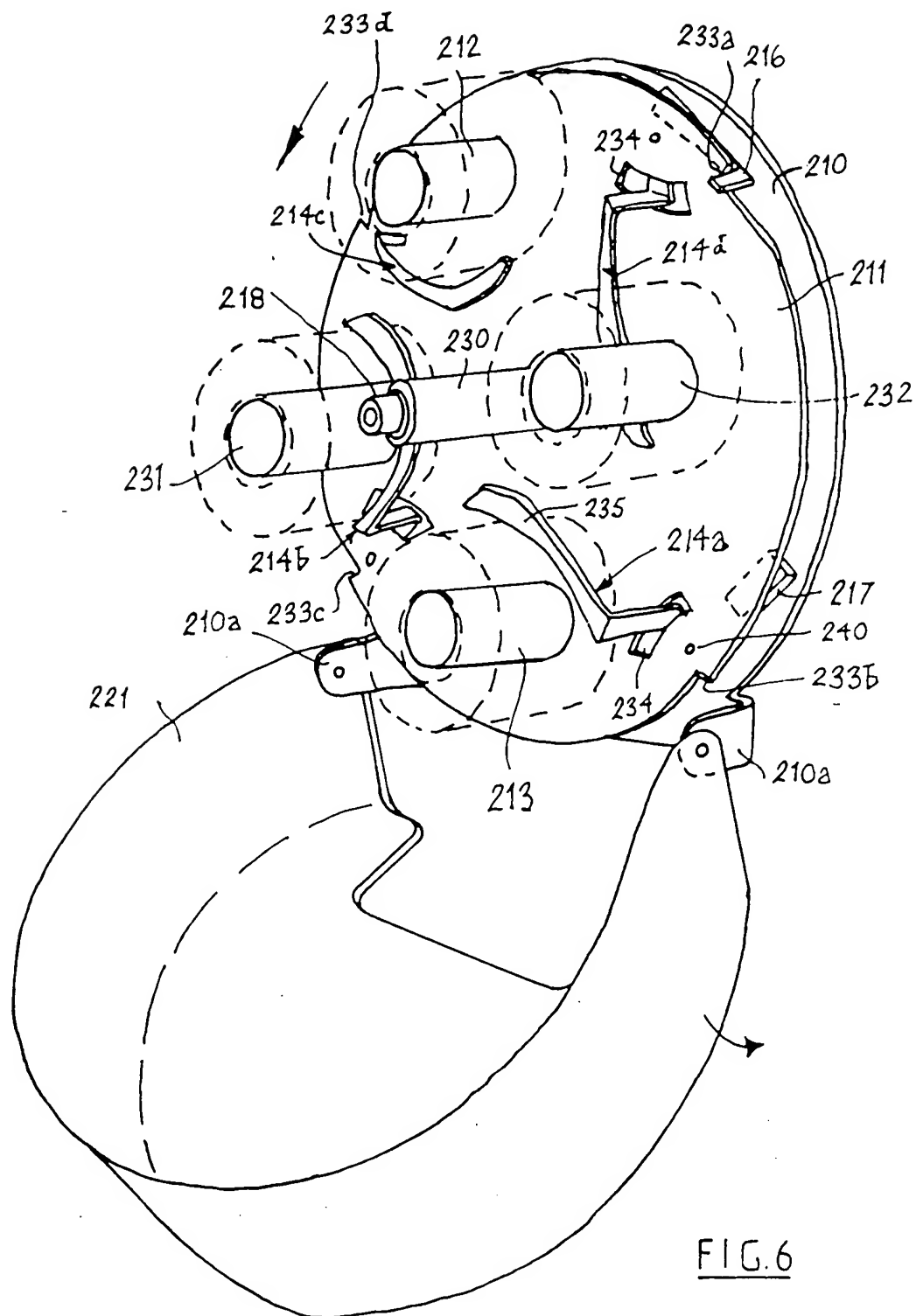


FIG. 7

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IMPROVED DISPENSER FOR DISPOSABLE SHEET  
MATERIAL SUPPLIED IN ROLL FORM

This invention relates to an improved dispenser for disposable sheet material supplied in roll form which provides at least one roll of sheet material in a use position for dispensing by a user and at least one stand-by roll of material in a back-up or reserve position for use when the roll(s) in the use position is at least substantially expended.

10 The invention has particular utility in the case of paper products in roll-mounted sheet form (such as paper towels and toilet paper) wound on a core and in its preferred embodiments provides a dispenser which automatically moves a new roll or rolls into the use position when the roll(s) previously in that position has (have) been at least substantially completely used up.

In public washrooms or toilets it is desirable to provide a continuously available supply of rolls of paper towels or toilet paper and the services of maintenance personnel are required to ensure that spent rolls are periodically removed and replaced with new rolls. The usage rate cannot be accurately predetermined and if the loss of supply at any time is to be surely avoided it is necessary either to arrange for maintenance visits to be more frequent than is normally required, or to provide a reservoir of sheet material that cannot be tampered with while the initially-provided supply is available, but which becomes available for use when the initially-provided supply has been used up.

30 The prior art discloses a number of proposals for supporting spare or reserve rolls out of sight of the user while providing means to make the spare or reserve rolls available when needed. Amongst such prior proposals may be mentioned GB-A-1171309, GB-A-1303561, GB-A-1427516, GB-B-

2108927 and GB-B-2138777. The prior art arrangements, however, suffer from some disadvantages such as excessive cost to install, unreliability in action, excessive size and in particular difficulties for the user to secure supply  
5 from the stand-by roll and/or the maintenance personnel to replace spent rolls and re-commission the dispenser for further use. This invention seeks to overcome the limitations of the prior art arrangements.

According to the present invention a dispenser for  
10 disposable sheet material supplied on a core in roll form which provides an accessible supply of sheet material from at least one roll in a use position and at least one stand-by roll in a reserve position, comprises a base, a roll-support member having "n" parallel spaced-apart roll-core  
15 support means each adapted to support at least one roll with the axes of the cores of all rolls supported on the roll-support member parallel, pivot means mounting the roll-support member to the base so that the roll-support member can turn relative to the base about an axis parallel to the  
20 core axes through "n" possible roll-change advances, means to sense when the residue on a roll (or all rolls) in the use position has reached a determined minimum, and means to release the roll-support member for movement to replace the spent roll(s) by at least one stand-by roll is characterised  
25 in that first stop means is provided to prevent the roll-support member moving from the respective use position in a direction opposite to that used for a roll-change advance and second stop means is provided to release the roll-support member from the respective use position for a new  
30 roll-change advance, the second stop means being actuated by the residue sensing means, and in that when the last stand-by roll(s) is/are in the use position the spent roll or rolls is/are in the or all of the stand-by positions.

In a simple dispenser according to the invention "n" is  
35 two and a roll-change advance is through substantially 180° Each of the two roll-core support means provided on the roll-support member can accommodate more than one roll



aligned axially end to end but the simplest dispenser would have just one roll in the use position and just one in the stand-by position.

Dispensers where "n" equals 3, 4 (or even more) and the  
5 respective roll-change advance angles are 120°, 90° (or less) are also possible.

Preferably the force available to turn the roll-support member through a roll-change advance is created simply by virtue of the greater potential energy available in the  
10 stand-by roll(s) than in the spent (or nearly spent) roll(s) in the use position, but the use of spring means to assist such advance is not ruled out.

Desirably the residue sensing means comprises a member engaging the periphery of the in-use roll and moving towards  
15 the axis of the core of the in-use roll as sheet material is removed therefrom. The member can be a pivoted lever and one such lever can be provided for each roll-core support means. A roller can be used to reduce drag on the wound-on sheet material. Suitably, the sensing means senses the  
20 radial thickness of the core plus residual sheets on the in-use roll or the least used of the in-use rolls.

Preferably, the residue sensing means is gravity urged into contact with part of the upper periphery of the in-use roll, whereby the residue sensing means moves downwardly as  
25 sheet material is progressively removed from the roll in the use position. In this way, the second stop means can include an obstruction on the base, the residue sensing means engaging the obstruction to prevent turning of the roll-support member for a roll-change advance when there is  
30 a usable supply on at least one roll in the use position, but which loses engagement with the residue sensing means when the latter has lowered to the level determined to represent a spent roll in the use position.

The residue sensing means can be a lever which

protrudes through an aperture in the roll-support member and is pivotally attached thereto, a part of the lever overlying the front of the roll-support member bearing on the periphery of the adjacent roll and a part of the lever  
5 located to the rear of the roll-support member forming part of the second stop means to arrest roll-change advance.

The first stop means can be a ratchet arrangement provided to engage the roll-support member on initial set-up and following a roll-change advance and to prevent the roll-  
10 support member moving in a direction opposite to that used for a roll-change advance. The ratchet arrangement can also be gravity-urged into engagement.

The base can include a cover which protects the at least one stand-by roll but which leaves at least a part of  
15 the in-use roll exposed for removal of sheet material therefrom. To allow access to the at least one stand-by roll and permit removal of spent cores by maintenance personnel, the cover or a part thereof can be hingedly attached to the base. A catch means, lockable by a key or  
20 other access tool provided to maintenance personnel, can be provided on the cover or part thereof. Windows can be provided in the cover to enable the number of stand-by rolls available to be determined by visual inspection without removing the cover.

25 Three embodiments of dispenser according to this invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic exploded view of a first embodiment of dispenser,

30 Figures 2, 3 and 4 show, in schematic end view, a second embodiment of dispenser showing, in Figure 2, a full in-use roll and a full stand-by roll, in Figure 3, a spent in-use roll in the process of moving into the stand-by position, while the stand-by roll is moving down to the use

position and in Figure 4 the new roll in place in the use position, and

Figures 5, 6 and 7 show a third embodiment of dispenser, respectively, in closed condition ready for use, opened condition ready for reloading and a part view on an enlarged scale of the residue sensing means shown in Figure 6.

Referring to Figure 1, the dispenser comprises a base plate 10, a roll-support arm 11 having first and second roll-core support rods 12 and 13, each adapted to support the core of a conventional roll of toilet paper (not shown in Figure 1), residue sensing means 14 slidably mounted in a channel 15 of the arm 11, and first (16) and second (17) stop means associated with the base plate 10.

The arm 11 and residue sensing means 14 are symmetrical about both vertical and horizontal axes as shown in Figure 1, the arm being pivotally supported on a spindle 18 projecting from the base plate 10 and containing the residue sensing means 14, in the channel 15.

The first stop means 16 is designed to engage the arm 11 and the second stop means 17 is designed to engage the residue sensing means 14 except when the latter is in its lowermost position. The height at which the residue sensing means is held in the channel 15 is determined by a pair of sensing pegs 19 which pass through slots 20 in the arm 11 and rest on the periphery of the in-use roll.

The dispenser shown in Figure 1 operates as follows:

Let it be assumed that a full roll of toilet paper is located on each rod 12, 13, the arm 11 being vertical and held there against clockwise movement by engagement of the arm 11 with the first stop means 16 and against anti-clockwise movement by engagement of the residue sensing means 14 with the second stop means 17.

The lower roll is in the use position and paper from this is accessible for removal from the in-use roll as required. The upper roll is concealed behind a cover 21 and serves as the stand-by roll. As the size of the in-use roll  
5 diminishes, the residue sensing means 14 drops within the channel 15 due to the pegs 19, resting on the in-use roll, moving down as paper is removed from the lower roll. The length of the residue sensing means 14 and the position of the second stop means 17 is selected to ensure that anti-  
10 clockwise restraint of pivoting of the arm 11 is lost only when a minimum of paper is left on the in-use roll. When anti-clockwise restraint is lost, the turning moment on the arm 11 generated by a full stand-by roll and a spent in-use roll, causes the arm 11 to turn anti-clockwise on the  
15 spindle 18. As the arm 11 completes its turn through 180°, the stand-by roll moves into the use position, the spent roll moves into the stand-by position and the residue sensing means 14 slides down to leave the pegs 19 resting on the full roll now in the use position. In this position of  
20 the residue sensing means 14, the second stop means 17 is re-effective so that as the arm 11 snaps past the first stop means 16 it is relocked in a near-vertical position between the stop means 16 and 17.

The stand-by roll can now be used pending the arrival  
25 of maintenance personnel to replace the spent roll with a new stand-by roll and, if the in-use roll is also substantially used, to replace that also.

The entire cover 21 could be hinged on the base plate  
10 to permit easy access to the rolls on the rods 12, 13 or  
30 a part (e.g. shown by chain lines 21a) could be hinged to the rest of the cover for that purpose.

The second embodiment shown in Figures 2, 3 and 4 is similar in functional performance to that described with reference to Figure 1, and for ease of understanding,  
35 similar reference numerals as used in the description of the first embodiment, but increased by 100, are used to

designate equivalent components in the second embodiment. Reference will now be made to the main features of difference between the two embodiments.

5 The base plate 110 is generally rectangular with an upper lid 122 and the cover 121 is in generally tubular form open at each end but rotatable with the roll-support arm 111. The first stop means 116 pivots upwardly to allow the final part of a roll change advance to occur, rather than being depressed towards the base plate 10 as occurs in the case of the stop means 16. Paper from the in-use roll on the lower rod 113 passes out of the cover 121 through the open bottom thereof.

15 The third embodiment shown in Figures 5, 6 and 7 is similar in functional performance to that described with reference to the earlier Figures and for ease of understanding the reference numerals used in Figure 1 will be increased by 200 when referring to equivalent components. Reference will now be made to the main features of the third embodiment.

20 The base plate 210 is generally circular and supports a central spindle 218 projecting forwardly therefrom. A lower part of the base plate 210 has ears 210a from which the cover 221 pivotally depends. The roll-support member 211 is a disc having a central tubular bearing 230 (which receives the spindle 218) and four rods (or tubes) 212, 213, 231 and 232 projecting forwardly therefrom.

30 A fixed stop member 217 and a pivoted lever 216 are provided on the base plate 210. The stop member 217 is engaged by one of the four residue sensing levers 214a, 214b, 214c and 214d in turn, to control roll advance movements of 90° of the disc 211 in the anti-clockwise direction. The lever 216 is gravity-urged to engage behind one of the ratchet teeth 233a, 233b, 233c and 233d (provided in the periphery of the disc 211 at 90° intervals) at the end of each roll advance. Thus when each roll is occupying

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the lowermost or in-use position the disc 211 is locked against rotation in both clockwise and anti-clockwise directions by the ratchet or first stop mechanism 216/233 and the second stop means 214/217.

5        Each pivoted lever 214 projects through an arcuate aperture 234 in the disc 211 having a sensing part 235 which overlies the front of the disc and rests against the respective roll, and a disc-releasing part 236 which lies behind the disc 211 where it can co-act with the stop member  
10 217.

Figure 7 shows one of these levers in greater detail, the bends separating the parts 235 and 236 occurring at the line 237 in Figure 7. The shaping of the underside of the part 235 is chosen to provide smooth snag-free engagement  
15 with a roll irrespective of its diameter between full and expended states.

The outer curved surface 238 of the part 236 engages the stop member 217 and is curved about a centre 239 which is spaced slightly from the pivot axis 240 of the lever 214.  
20 The arcuate slot 241 in the part 236 accommodates a peg projecting from the rear of the disc 211 and assists in controlling the movements of the lever 214. Figure 7 shows the lever 214 in an effective position in full lines and the position indicating release for the next roll advance in dashed lines. Adjustment of the precise point at which  
25 release from the stop member occurs can be simply achieved by adjustably mounting the stop member 217 on the base plate 210 (i.e. as shown by the arrows A, A). As paper is removed from the in-use roll, the part 235 moves downwardly in the  
30 direction of the arrow B as the lever 214 turns in the direction of the arrow C.

An important feature of the third embodiment is the way in which a bias for anti-clockwise turning of the disc 211 during roll advances is achieved by locating the first and  
35 second stop means so that the diametral plane containing the

axes of the highest and lowest core rods (212, 213) is displaced anti-clockwise (e.g. between 5° and 15°) with respect to the vertical plane. Such a displacement (10° has proved convenient in one case) ensures there is a gravity-induced turning moment on the disc 211 at all times except when 4 identical full rolls are located on the core rods.

Gravity-actuated levers 216 and 214 are convenient from considerations of cost of manufacture but clearly spring assistance can easily be provided.

10        A lock 245 for the cover 221 can be seen in Figure 5 and this can engage the spindle 218. Windows 246 are also shown in Figure 5 and these provide a remote indication of the state of the rolls in the three stand-by and one in-use roll positions.

15        Further embodiments are also possible within the scope of this invention. Thus, for example, two rolls can be mounted end to end on each of rods 12, 112, 212 and 13, 113, 213 providing initially two in-use rolls and two or six stand-by rolls, a roll change advance occurring only when  
20 both of the in-use rolls are exhausted, by the simple expedient of making the sensing pegs 19, 119 long enough and levers 214 wide enough to contact the periphery of whichever of the two in-use rolls has the largest radial thickness. Also, for example, the support arm can have two stations for  
25 stand-by rolls (requiring an advance of 120° to effect a roll change).

By scaling up the dispensers described they can be used to accommodate paper towelling in roll form.

Each sensing peg 19, 119 can be a roller to reduce  
30 friction on the roll(s) in the in-use position.

By simple redesign each roll-change advance could be in the clockwise direction with the first stop means preventing anti-clockwise advance.

CLAIMS

1. A dispenser for disposable sheet material supplied on a core in roll form which provides an accessible supply of sheet material from at least one roll in a use position  
5 and at least one stand-by roll in a reserve position, comprises a base, a roll-support member having "n" parallel spaced-apart roll-core support means each adapted to support at least one roll with the axes of the cores of all rolls supported on the roll-support member parallel, pivot means  
10 mounting the roll-support member to the base so that the roll-support member can turn relative to the base about an axis parallel to the core axes through "n" possible roll-change advances, means to sense when the residue on a roll (or all rolls) in the use position has reached a determined  
15 minimum, and means to release the roll-support member for movement to replace the spent roll(s) by at least one stand-by roll, characterised in that first stop means is provided to prevent the roll-support member moving from the respective use position in a direction opposite to that used  
20 for a roll-change advance and second stop means is provided to release the roll-support member from the respective use position for a new roll-change advance, the second stop means being actuated by the residue sensing means, and in that when the last stand-by roll(s) is/are in the use  
25 position the spent roll or rolls is/are in the or all of the stand-by positions.

2. A dispenser according to claim 1, in which "n" equals 2 and each roll-change advance is through substantially 180°.

30 3. A dispenser according to claim 1, in which "n" equals 4 and each roll-change advance is through substantially 90°.

4. A dispenser according to any one preceding claim,



in which the force available to turn the roll-support member through a roll-change advance is created simply by virtue of the greater potential energy available in the stand-by roll(s) than in the spent (or nearly spent) roll(s) in the  
5 use position.

5. A dispenser according to any preceding claim, in which the residue sensing means comprises a member engaging the periphery of the in-use roll and moving towards the axis of the core of the in-use roll as sheet material is removed  
10 therefrom.

6. A dispenser according to claim 5, in which the residue sensing means is gravity urged into contact with part of the upper periphery of the in-use roll, whereby the residue sensing means moves downwardly as sheet material is  
15 progressively removed from the roll in the use position.

7. A dispenser according to claim 6, in which the residue sensing means is a pivoted lever there being one such lever for each roll-core support means.

8. A dispenser according to any one preceding claim,  
20 in which the second stop means includes an obstruction on the base, the residue sensing means engaging the obstruction to prevent turning of the roll-support member for a roll-change advance when there is a usable supply on at least one roll in the use position, but which loses engagement with  
25 the residue sensing means when the latter has lowered to the level determined to represent a spent roll in the use position.

9. A dispenser according to any one preceding claim, in which the residue sensing means is a lever which  
30 protrudes through an aperture in the roll-support member and is pivotally attached thereto, a part of the lever overlying the front of the roll-support member bearing on the periphery of the adjacent roll and a part of the lever located to the rear of the roll-support member forming part

of the second stop means to arrest roll-change advance.

10. A dispenser according to any one preceding claim, in which the first stop means is a ratchet arrangement provided to engage the roll-support member following a roll-change advance and prevent the roll-support member moving in a direction opposite to that used for a roll-change advance.

11. A dispenser according to claim 10, in which the ratchet arrangement is gravity-urged into engagement.

12. A dispenser according to any one preceding claim, in which the base includes a cover which protects the at least one stand-by roll but which leaves at least a part of the in-use roll exposed for removal of sheet material therefrom.

13. A dispenser according to claim 12, in which to allow access to the at least one stand-by roll and permit removal of spent cores by maintenance personnel, the cover or a part thereof can be hingedly attached to the base.

14. A dispenser according to either of claim 12 or claim 13 in which a lockable catch means is provided on the cover or part thereof.

15. A dispenser according to any one of claims 12 to 14, in which windows are provided in the cover to enable the number of stand-by rolls available to be determined by visual inspection without removing the cover.

16. A toilet paper dispenser substantially as herein described with reference to and as illustrated in Figure 1 or Figures 2 to 4 of the accompanying drawings.

17. A toilet paper dispenser substantially as herein described with reference to and as illustrated in Figures 5 to 7 of the accompanying drawings.